

APRIL/MAY 2024

**GEPH42A/DEPH42A — CRYSTAL GROWTH  
AND THIN FILMS**

Time : Three hours

Maximum : 75 marks



**SECTION A — (10 × 2 = 20 marks)**

Answer ALL questions.

1. Define nucleation.
2. What is meant by solubility?
3. What are the advantages and disadvantages of the hydrothermal technique?
4. Distinguish between solid phase and liquid phase crystal growth.
5. What is meant by point group?
6. When does twinning occur in a crystal lattice?
7. How thin films can be used in devices?
8. Differentiate reactive and radio frequency sputtering.



9. How does NMR spectroscopy work?
10. Differentiate thermo-luminescence and photoluminescence.

SECTION B — ( $5 \times 5 = 25$  marks)

Answer ALL questions.

11. (a) Classify the different shapes of nuclei and explain the same.

Or

- (b) Explain the classical theory of nucleation in detail.

12. (a) With a neat schematic diagram, explain the different parts of the MOCVD reactor. Give its significance.

Or

- (b) Write a note on gel growth.

13. (a) What are Symmetry operations? Explain the meaning of a  $n$ -fold rotation axis and  $n$ -fold screw axis.

Or

- (b) Illustrate few important types of Crystal Structure.

14. (a) How thin films can be prepared by spray pyrolysis technique.

Or

- (b) Explain the electrodeposition technique in detail.

15. (a) Explain the working principle of FTIR spectroscopy with a neat diagram.

Or

- (b) Write a detailed theory on the working of AFM.

SECTION C — ( $3 \times 10 = 30$  marks)

Answer any THREE questions.

16. Explain in detail about BCF theory.
17. Explain the construction and working of Bridgman technique in detail.
18. Discuss the various types of defects in crystal.
19. Explain how thin films can be formed by the pulsed laser deposition technique.
20. Explain the principle, construction and working of TEM. Give its merits.